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EDITORIAL NOTES

FUEL RATIONING

THE pronouncement made by the President of the Board of Trade in the House on April 21 ("JOURNAL" of April 22, p. 128) that coal, coke, and paraffin will be rationed as from June 1 and that gas and electricity will be rationed "as from about the same date" has met with a critical and unfavourable reception in the House and a critical reception by the general Press. The view taken against it is that any scheme would be so difficult and costly to administer as to make it impractical. Demand for coal outstripping supply, what action has been taken by the Government to promote the needed production of coal at the pits has so far failed in its purpose. Simultaneously exhortations to domestic consumers to exercise voluntary economies have proved insufficient. Hence the announcement of the Government's decision. Mr. Dalton said it was hoped through the operation of the scheme, arrived at after consideration of the report by Sir William Beveridge on methods of rationing, to reduce the domestic consumption of coal by about 10,000,000 tons a year. This amount, which is large, represents something like 12½% of the domestic consumption, but it represents less than 5% of the total national requirements, and it has been strongly argued that this tonnage could, if the problem was tackled with determination, be made up without grave difficulty at the source.

In view of the importance of the matter, we think it unfortunate that the decision of the Government should have been given in the absence of publication of the Beveridge report. Immediately the announcement was made by Mr. Dalton the desire was expressed in various quarters that the House should be given an opportunity of discussing the scheme before it came into operation, and that the Beveridge report should be published. Since then, under the stress of accumulating opposition, an undertaking has been given in the Commons that the Government will afford an early opportunity for a debate on the report and recommendations, which presumably will be published. This debate, it has been promised, will take place before any rationing Order is made. It was not included in the business originally arranged. In the House—and this is the crux of the matter—speculation was quickly rife about whether the scheme would be sound practically in view of its inherent difficulties and the administrative burden it would necessarily impose. It was asked, for example, whether 10,000 or 15,000 officials would be required for the working of the scheme. Many members have expressed the belief that the supervision of such a scheme, which would mean dealing with 12,000,000 households or other establishments which would come under a domestic scheme, must at any rate require the appointment of a further very large number of officials, apart from technical difficulties, and that the proposed saving of less than 200,000 tons of coal a week seems disproportionate to the vast amount of cost and trouble involved. On Thursday last the following motion was tabled by an influential body of members headed by Sir John Wardlaw-Milne, Chairman of the Select Committee on National Expenditure: "That this House is of opinion that before any scheme for the rationing of fuel is instituted and, in view of the admitted difficulties of operating any plan for restrictions of household electrical and gas supplies, steps should be taken in accordance with the recommendations of the Select Committee on National Expenditure in their Third Report of the Session 1941–42, to release men temporarily from the Army and in other ways there set out materially to increase the production of coal in this country which is essential as a basis for an extended war production effort." We discussed the problem in the light of this report in the "JOURNAL" of Nov. 12 last.

Regarding the technical difficulties of fuel rationing, obviously the Gas Industry knows fully about these and has at all times done all possible to help in implementing the Government's wishes and demands. On the face, it may seem unfortunate that a demand in the national interests for the utmost production of gas, coke, and tar and for the maximum extraction of benzole and toluole should be accompanied by restrictions on gas usage even for domestic purposes. We look at the matter in the firm belief that everybody would be prepared to sacrifice much further in heat comfort if he was assured that the cumbersome rationing means would in fact justify the end. That, to our mind, is the one point at issue. The Government's expressed intentions are that each house shall have a fuel ration calculated on present needs and not by reference to previous consumption, and that in addition each person shall have a personal ration. If the Order is made—and there is no indication yet of any change of intention on the part of the Government—the principle of "points" rationing will be applied and the consumer can make up his limited supply between the five forms of fuel. With this basis we have no quarrel. It seems to us a fairer basis of rationing than past consumption. But after this the problems really start, and the scheme cannot be properly judged in the absence of details concerning the proposed methods of operation. However, as has been stated, the scheme is to be subject to debate before the Order is made.

[As we go to press, we learn that the Beveridge Report will be available to the public by the time this issue of the "JOURNAL" appears in print.]

WARTIME SULPHUR REMOVAL

FOR many years the Commercial Gas Company has been using with very satisfactory results burnt oxide for the removal of sulphuretted hydrogen from gas, and its experience, characteristically placed freely at the disposal of other gas undertakings, has proved immensely helpful under war conditions and the cessation of oxide supplies from oversea. Soon after the outbreak of war the London and Southern District Junior Gas Association had a Paper on the use of burnt oxide by Mr. G. E. Thompson of that Company ("JOURNAL" of Nov. 25, 1939). Experiences of its use have since been published, the most recent being the communication of Mr. A. J. Doran, of Edinburgh ("JOURNAL" of Feb. 4 and Feb. 11 of this year). We now have a further important practical contribution on the subject by Mr. G. Dougill, the new President of the London Juniors, whose Address to the Association given last Friday to an appreciative and relatively large audience was devoted solely to this wartime measure; and it was natural that Mr. Dougill should warmly acknowledge the help received from the previous work and lengthy experience of the Commercial Company. The Address (see p. 166 of to-day's "JOURNAL") was specificially concerned with the working of the purifiers on burnt oxide at the Beckton Station of the Gas Light and Coke Company, of which Station Mr. Dougill is Chief Assistant Engineer, and where 3,000–4,000 tons of reburnt oxide mixture have now been used successfully.

Normally Beckton used about 6,000 tons of new oxide every

year. It is a balancing station, and obviously purification streams must always be in a good condition and able to take overloads. Purification results aimed at and achieved are 8–10 grains of sulphur in the final gas. The problem of change-over to the use of burnt oxide was tackled on mass-production lines, and Mr. Dougill told his story with clarity and with a brevity which befits the times. There is no need for us to go into detail about the Address. Broadly, the *modus operandi* is to take a suitable mixture of burnt oxide, lightening agent, activating agent, neutralizing agent, and water. In preliminary working a suitable mixture was found to be 20 cwt. of reburnt oxide together with 3 cwt. of softwood sawdust, 2 cwt. of copperas, 1 cwt. of slaked lime, and 55 gallons of water. The mixture was about equal in performance to a Belgian oxide and it could be prepared economically. Hardwood sawdust was too fine and gave rise to back-pressure. Weathered reburnt has been used so far, but it would seem that, suitably applied, material straight from the burners would be equally satisfactory. For reasons given in the Address, the neutralizing agent was subsequently changed, the lime being substituted by ammonia. The activating agent, $FeSO_4$, is, we gather, fundamental to the process as forming with the alkali a precipitated iron oxide.

We are inclined to quote the following statement from the Address: "The procedure is now quite normal. Burnt oxide is received regularly and mixed with its sawdust and copperas into stock and used as new material. Mixtures of this with part spent material from previous synthetic mixtures are being used. Naturally it is not so simple as buying a natural product and it involves more plant, labour, and supervision, but the success of our efforts has been gratifying and has helped us out of a difficult position." This is a modest enough statement, but it will be apparent that underlying the successful results given by Mr. Dougill there has been much concentrated work. Wisely, we think, there was no mention of costs; these would only be misleading. A proved wartime recipe for purification is set out, and it should be easy enough for anyone interested to work out his own costs under his own conditions of mixing. We regard it as fortunate that the Gas Industry, faced with unusual manufacturing problems, can deal with them in its stride.

RECONSTRUCTION

LAST week Lord Portal made his maiden speech in the House of Lords as Minister of Works and Planning, and though what he had to say was couched in general terms without reference to concrete steps of rapid action, the speech should have brought a large measure of satisfaction to those many who were feeling uneasiness at the long silence since the announcements of the Government's intentions in regard to post-war reconstruction were made by Lord Reith and Mr. Greenwood. Lord Portal reaffirmed the assurances given by Lord Reith last February of the intention of the Government to set up a national planning authority with adequate powers. The general desire now is for more concrete measures in execution of the declared policy. Planning, then, is still definitely a national policy and not a subsidiary activity, and this policy directly and substantially affects the Gas Industry as, indeed, all public utility services. The main significance to the Gas Industry and to the individual untertakings comprising it is the broad plan envisaged —co-ordination of local plans fitting into a wider framework, the encouragement of combinations of planning authorities over areas which demand planning as a composite and maybe large unit. The effects of this will obviously be felt by individual gas undertakings, which themselves must fit in with regional schemes. This does not imply the doing away with local planning and local administration; it means that the areas must be large enough to make them effective. It is fully realized that the parochial and urban district view is too circumscribed for the requirements of efficiency in a number of public services, and not least in the Gas Industry, the future of which must be shaped to accord in principle with this underlying conception of planning and reconstruction.

GOODWILL AND EMPLOYMENT

THERE has been interesting and, we think, helpful discussion of late on the value of advertising in wartime.

We referred to the subject in these columns in our issue of April 8, when we suggested that in so far as advertising can be shown to be helping in the war effort, however indirectly, or the preservation of that for which we are fighting, it should be encouraged as far as circumstances will allow. To our mind much commercial advertising is doing a job which would otherwise have to be done in other ways. It is easy, we remarked, to say that firms and undertakings would not advertise unless they thought it was to their benefit, but we cannot regard this as an argument against the continuance of advertising. Even in the midst of war it is impossible to ignore the problems of reconstruction that will come after; those who are advertising now to preserve goodwill—the probability that their customers will come back to them after the war—are consulting not only their own interests but the national interests as well.

Regarding this aspect we were impressed by a letter published in the *Times* last Friday. It was written by an executive responsible for finding employment for some 2,000 people normally. The business in question has been in existence for 100 years, and on the salaries and wages paid depend about 30% of the population of a small and isolated town. A large sum of money has been spent for many years on national advertising in order to spread demand and production as evenly as possible over the year and to maintain and develop the goodwill of a nationally recognized brand. The argument advanced by the writer of the letter to which we have referred was that 400 of the firm's people are away on war service and must be provided for on their return, and that the firm's power to maintain them after the war is dependent on the preservation of goodwill. Therefore the firm must continue to advertise even in wartime, not wastefully, but to that reasonable extent which will protect its workers and the public. In the last war this particular firm, "from patriotic but mistaken motives stopped advertising almost entirely, with the result that when the slump came the business went through a bad patch, under-employment was rife, and a very large additional expenditure had to be incurred to recover the 'steerage-way' which had been lost entirely." And the correspondent concluded: "On these facts my Company will continue reasonable advertising during the war, in order to protect its business, its workers, its retail distributors, and its public. This is the only umbrella under which the responsibilities due to them can be discharged." This argument, it may be said, was put forward by a firm making a popular brand of shoes, but we regard it as cogent and as of general application.

Personal

We announced last week that Mr. E. F. SMALLBONE had relinquished his position as Engineer and Manager of the Herne Bay Gas Company to take up a similar position with the Folkestone Gas and Coke Company. Mr. Smallbone was appointed to succeed Mr. F. Dawson in January, 1941, at the same time retaining the post of Engineer and Manager of the Broadstairs Gas Company. He held the position at Broadstairs for over 20 years.

We also announced that Mr. ARTHUR WELLS, who has held the post of Works Manager since 1924, has been appointed Engineer of both the Herne Bay and the Broadstairs Gas Companies. He received his training at the Mid-Kent, Tonbridge, and Sevenoaks Gas Undertakings. Before going to Herne Bay he spent three years as Engineer and Manager of the Milton Regis Gas Department.

Mr. G. S. WAREHAM has been appointed Local Secretary of the Broadstairs Gas Company and will continue to hold his position as Secretary of the Herne Bay Gas Company. He went to Herne Bay in 1922 after seven years on the staff of the Salisbury Gas Company, and took a leading part in the introduction of machine bookkeeping and continuous meter reading in the Company's office in 1931, being appointed Secretary in 1934. In 1936 Mr. Wareham carried out a similar re-organization in the office of the Broadstairs Gas Company.

* * *

Mr. J. A. SEABROOK has been appointed Engineer, Manager and Secretary to the Elland-cum-Greetland Gas Company in succession to the late Mr. James Bridge.

Obituary

JAMES TAYLOR

A Tribute from the South-West

With the passing of James Taylor, Engineer and Managing Director of the Weston-super-Mare & District Gas Company, the Gas Industry has lost a capable Engineer and Administrator. Those who were privileged to be his colleagues in the South West have lost a good friend and neighbour, and his place in their Councils will be difficult to fill.

He took a prominent and active part in both the national and regional activities connected with the Gas Industry, and served it in many capacities, and the painstaking conscientiousness with which he performed such services, his sound judgment, sweet reasonableness, and unfailing good humour earned for him the high esteem and affectionate regard of his colleagues.

As Secretary to the South-Western District Committee of the Federation of Gas Employers and Joint Secretary to the Regional Gas Council since the inception of both, he had acquired an extensive and intimate knowledge of the many and varied labour problems of the district, and his office at Weston had for long been a clearing house for information on practice and procedure. His advice was sought by, and freely given to, representatives of both employers and employees, and his tactful and understanding ways, and still more the "happy ending" invariably secured, gained for him the entire confidence of both sides.

Since he came to Weston-super-Mare in 1915, the business of the Gas Company increased three-fold. The task of keeping pace with this development was an exacting one, and the present high standard of efficiency of the works and organization of his Company bear testimony to his technical and commercial ability.

Notwithstanding the exacting character of Mr. Taylor's duties in connexion with his own Company and Industry, he also gave ungrudgingly and unstintingly of his time and energies in service to the social and religious life of his adopted town, and the large and representative congregation which assembled in the Parish Church at Weston-super-Mare on April 14 to pay tribute to his memory reflected the sense of loss and the high regard in which he was held by every section of that community.

His bereaved wife and family have our deepest sympathy. May they be comforted by the knowledge that he has left behind him the memory of a gracious and lovable personality—an example to all who would leave the world a better place than they found it. Of James Taylor it may truly be said, "To live in the hearts we leave behind is not to die."

April 25, 1942.

* * *

The death has occurred of Mr. HAROLD BURNET, Chief Engineering Assistant at Blackpool Gas-Works since 1935, and previously on the staff of the Preston Gas Company.

Coal Tar and Coal Tar Products

The Secretary for Mines announces that the Board of Trade has made the Control of Coal Tar Order, 1942, under Regulation 55 of the Defence (General) Regulations, 1939. The Order is to come into force on May 1 and will supersede the Control of Coal Tar Order, 1941, S.R. & O., 1941, No. 81.

The increasing importance of coal tar products to the war industries has necessitated the assumption of a wider form of control. The main provisions of the 1942 Order are:

1. The Secretary for Mines will continue to control by licences the acquisition of coal tar in quantities exceeding 50 gallons at any one time and more in the aggregate than 250 gallons in the period of any one year. Coal tar may be treated, used, or blended only under the authority of a licence, with the exception of blending by producers.
2. The disposal of all coal tar products by distillers and importers will be subject to licence.
3. The Secretary for Mines may in relation to coal tar products direct that any product specified in the direction may not as from the date specified therein be acquired without a licence.
4. The Order empowers the Secretary to give directions regarding the disposal, treatment, use, and blending of coal tar and coal tar products, and provision is made as to the price at which directed material shall be sold or supplied.
5. Provision is made for the prohibition of the sale of any coal tar product as specified in a direction given by the Secretary after a date specified therein except by distillers, importers, or registered sellers (all of which expressions are defined in the Order) and for the registration of such sellers.

The provisions in the Control of Coal Tar Order, 1941, dealing with general price control are not included in the new Order as it is proposed to fix prices in separate Orders as and when necessary.

Applications for licences should be made to the Coal Tar Controller, Quebec House, Quebec Street, Leeds, 1.

Road Tar Prices

The Board of Trade give notice that in pursuance of Regulation 55 of the Defence (General) Regulations, 1939, they have made the Road Tar Prices (Inland) Order, 1942.

Under the Order, which is to come into force on May 1, no person may sell or supply road tar otherwise than at the fixed prices quoted in the Order. The prices, which are based on regional schedules and types of container used, may be increased for the sale or supply of road tar in small quantities.

Road tar, as defined in the Order, includes road tar bitumen mixtures containing up to 10% of bitumen, and provision is made for the Secretary for Mines to fix by Direction an additional charge for such mixtures above the fixed prices quoted in the Order. Provision has also been made whereby proprietary brands of Road Tar sold under a mark on or before June 30, 1941, and approved by the Secretary, may be sold at an additional price not exceeding 1½d. per gallon. The Secretary for Mines may in exceptional circumstances mentioned in the Order fix prices higher than those specified in the Order.

Road tar will be subject to the provisions of the General Control of Coal Tar Order, and all communications should be addressed to the Coal Tar Controller, Quebec House, Quebec Streets, Leeds, 1.

The Road Tar Prices Order (which does not apply to export prices) has been published as Statutory Rules and Orders, S.R. & O., 1942, No. 659.

Anthracene Prices

The Board of Trade also give notice that in pursuance of Regulation 55 of the Defence (General) Regulations, 1939, they have made the Anthracene Prices Order, 1942. The Order is to come into force on May 1 and will supersede the direction dated April 13, 1941, given by the Secretary for Mines under paragraph 8 (1) of the Control of Coal Tar Order, 1941, S.R. & O., 1941, No. 81.

The Anthracene Prices Order is similar in substance to the direction at present in force, but provision is made for the sale or supply of crude anthracene or unrefined crude anthracene of a quality unsuitable for the manufacture of dye-stuffs at a maximum price which is lower than the actual fixed price applicable to the sale or supply for such manufacture. The Secretary for Mines may also, in exceptional circumstances, mentioned in the Order, fix prices higher than those specified in the Order.

Anthracene will continue to be subject to the provisions of the General Control of Coal Tar Order, and disposal licences for off-standard paste will only be granted when material is definitely unacceptable for dye-stuffs manufacture. All communications should be addressed to the Coal Tar Controller, Quebec House, Quebec Street, Leeds, 1. The Order (which does not apply to export prices) will shortly be published as a Statutory Rule and Order, S.R. & O., 1942, No. 733.

Coal Tar Acids

The Secretary for Mines announces that the Board of Trade have made the Coal Tar Acids Prices (Inland) Order, 1942, which will come into force on May 1.

Under the Order, which relates to the prices of coal tar acids for home consumption only, no person may sell or supply coal tar acids mentioned in the Order at prices exceeding the maximum prices therein, and no person may sell or supply coal tar acids not specified in the Order without the permission of, and at the price fixed, by the Secretary for Mines.

Provisions are included in the Order regarding containers, and in cases in which delivery is not taken at the seller's works transport charges. A clause permits the re-sale by merchants of certain coal tar acids at a maximum price of 3% in excess of that specified in the Order. Phenol and phenol mixtures containing 80% and over of phenol have been excluded from the provisions of the Order because of price agreements between the Government and the trade already in operation.

The Order will shortly be published as Statutory Rules and Orders (S.R. & O., No. 731).

Naphthalene Prices

The Board of Trade hereby give notice that in pursuance of Regulation 55 of the Defence (General) Regulations, 1939, they have made the Naphthalene Prices (Inland) Order, 1942.

The Order is to come into force on May 1 and will supersede the Direction dated Oct. 3, 1941, given by the Secretary for Mines under paragraph 8 (1) of the Control of Coal Tar Order, 1941.

The Naphthalene Prices Order is similar in substance to the Direction at present in force, but provision has been made to include naphthalene with a melting-point below 50°C.

The Secretary for Mines may in exceptional circumstances, mentioned in the Order, fix prices higher than those specified in the Order. Provision has also been made for an increased price to be charged for the sale of naphthalene in small quantities, the additional allowance being subject to the size of the parcel. The position with regard to transport charges and containers has also been modified.

Naphthalene will continue to be subject to the provisions of the General Control of Coal Tar Order, and all enquiries should be addressed to the Coal Tar Controller, Quebec House, Quebec Street, Leeds, 1.

The Naphthalene Prices Order (which does not apply to export prices) will shortly be published as Statutory Rules and Orders (S.R. & O., No. 736).

BURNT OXIDE FOR PURIFICATION*

By

G. DOUGILL, M.Sc., F.I.C.,

Chief Assistant Engineer, Beckton Gas-Works

THREE thousand to four thousand tons of our own mixture of reburnt oxide have now been used successfully at Beckton, and in view of the national situation it is thought that the experience so gained will be of interest to members. As the methods of use may have a great bearing upon its success, a few details of the purification plant and its general control are desirable.

In the first place, Beckton is a balancing station, and must therefore be able to increase its gas output rapidly at short notice so that purification streams, though not unduly large in specific area, must always be kept in good condition and able to take considerable overload.

There are 24 streams, each of 4 to 16 boxes (all in sets of 4), making 170 boxes in all. They are of all types, C.I., and reinforced concrete, both at ground level and overhead, but all have this point in common, that they all have two layers approximately 18 in. deep and split flow —*i.e.*, the gas enters centrally and leaves at the top and bottom of the box. Approximately streams are arranged to be ½ sq.ft. of box area per 1,000 cu.ft. per day. Revivification air is forced in under pressure at the entrance to the first box only.

All oxide emptied from boxes is loaded into side tip wagons and immediately taken away to the oxide handling plant if for further use, or to stock if ready for sale.

This plant consists of a former retort house with the settings removed which is 500 ft. long and 100 ft. span. An overhead viaduct connected to the works railway system runs along one side and from this all new oxide is tipped. On the opposite side runs a ground level line where all wagons loaded with partly spent material enter and are tipped into an underground hopper through a 2-pair roll crusher to an elevator boot. This raises it into a pair of bar disintegrators which feed into another underground hopper.

The whole central span of the building is covered by a travelling electric crane which picks up the disintegrated material by grab and delivers it to stock. Normally 2,000 or 3,000 tons of partly spent oxide is kept in stock. The crane also picks up part spent material and new material, and delivers this into a loading hopper which refills the trucks which brought in the part spent.

Backward rotation is used, of course, in all streams, and changes of sequence are made at 5–10-day intervals. When the sequence of a set is changed, all closed valves are logged with water to ensure gas tightness, and similarly before a box is opened, inlet, outlet and bridle valves are closed and logged.

Normally in a "set" of 4 by 100 ton boxes, one box is refilled each 60 million cu.ft. of gas passed (coal gas). That is, each box passes 240 millions between fillings. This volume has been found by experience as the economic figure, and by this time the box is not too hard for rapid emptying.

At 450 grains of H_2S per 100 cu.ft. this represents 17.2 tons of sulphur per box, and about 4 cycles would be required to attain 55% sulphur. The same result could be obtained by using roughly two parts of third cycle part spent oxide with one part of new oxide for three boxes and 100% of third cycle part spent in the fourth. This would produce three boxes of third cycle part spent oxide and one ready for sale, and is the same result as passing new oxide through four cycles and for our plant has many advantages:

(1) Only one class of part spent is stocked.

(2) When a box is emptied the foreman can put his oxide to the correct heap without waiting for tests. This is of great practical advantage.

(3) The four boxes in a set are of fairly even activity.

(4) The cycle can be controlled at will by adjusting the addition of new oxide, usually between 25% and 50%.

(5) In spring a higher proportion of "part spent" boxes can be used, and *vice versa* in autumn.

(6) A heavily loaded stream can have no "part spent" boxes and leave its share to a lighter loaded stream.

(7) Control of sulphur in the saleable oxide can be easily effected by adjusting the percentage of new oxide being added.

Similar control of C.W.G. streams is exercised, except that the volume of gas between box changes is greater (about double) and the proportion of new oxide added is less.

A minimum of 5–10 grains of ammonia is desirable, oxygen in the outlet streams is kept between 0.6% and 0.7%, and inlet temperature at 85°F. approx. Sets are "swung" or changed in sequence at a minimum of 5-day intervals. Back pressure rarely causes trouble, though a few boxes are always found to be harder than usual and difficult to empty within the day Activity of boxes is usually well maintained, and if a set becomes less active, its cause is usually too low temperature, or occasionally too little ammonia. The chief technical trouble experienced has been the evolution of traces of H_2S from 3rd and 4th boxes into clean gas. In most cases this has been traced to the drips of condensate from the covers rendering the top (and therefore last) layer of oxide inactive as regards H_2S absorption and causing some gaseous constituent to evolve traces. It has been completely cured in many cases by reversing the direction of flow of the gas—*i.e.*, the gas enters at the top and bottom and leaves at the centre between the layers. This means that it leaves after passing through active oxide and all traces are thereby removed. In our boxes the alteration is simple, and only means that inlet and outlet standpipes and inlet and outlet bridle standpipes are exchanged in position.

Normally about 6,000 tons of new oxide are used per year, so that the position created by the complete cessation of supplies was serious, since stocks rarely exceed 5,000 tons.

The writer had had previous experience at the British Gas Light Company in the use of reburnt oxide, and the experience of the Commercial Gas Company, who have also used it for years, was placed freely at our disposal. In view of the short time available for any research, it was decided to "experiment" on a full scale.

A trial mixing of about 100/150 tons was made and was filled into a box. The use of 100% of new material is not normal Beckton practice. The experimental material was, however, charged separately to show how it worked alone, and to avoid any possible credit from partly spent material.

This first batch was mixed by hand, but was very patchy. However, it did its normal work in all positions, and came out on the usual schedule at 20.8% sulphur, though it was found to be very patchy, varying 10% sulphur above and below this figure. It was put through the disintegrator, and after standing for a week or two put back *en bloc* into a coke oven box, where again it gave satisfaction in all positions.

In view of this a second batch was mixed by hand, and put to work. Every possible method of hand mixing was tried, and the most successful appeared to be spreading one ingredient in a layer and covering it by the others, all in layers, and then shovelling this into a conical pile, breaking down the cone and repeating. This batch also worked normally.

The immediate problem, therefore, appeared to be that of finding a practical and economic method of mixing using existing equipment.

Four ingredients required mixing, and an experiment was tried in our oxide handling plant. The sawdust was stacked on an old staging over the railway line, and a trap door arranged over the centre of the truck. All water additions were made to the sawdust, which will absorb incredible volumes without appearing surface wet. One man was placed to deliver the correct volume of sawdust per truck through the manhole. A side chute was used so that the crane could deliver a suitable number of grabs of reburnt oxide into the truck, and two other men were posted so that one could throw in by shovel the correct volume of lime and the other the copperas.

At first an effort was made to add the materials in layers, but this was found to be unnecessary, and later all men worked simultaneously, which speeded up the job considerably. The wagon was then drawn along by the capstan, and tipped through the breaker-elevator and disintegrator into the hopper. It was found to be excellently mixed, in fact much better than by all our laborious hand methods. As can be seen, the method lent itself excellently to repetition work, since the trucks passed under the loading stage in sequence, received the varied ingredients, and passed on to the mixing.

A batch of 100/150 tons was prepared and filled into a box in one of our more heavily loaded streams, and good results were obtained as usual. By this time the first batch had come out from its second cycle at 40.7% sulphur, and had gone back to work for its third and last period. The box gave normal results—that is, it held the H_2S well for five days in first position, and gave our customary tests in the other three positions.

Consequently we had now arrived at this position: a mixture was known which would perform reasonably, probably about equal to a Belgian oxide, and which we could mix reasonably economically on our existing plant. This plant was already well loaded, but week-end working would probably cover most of our needs for the new mixture. In these circumstances it was decided to push ahead with the use of the mixture and to experiment with various ingredients and their proportions as we went along.

The mixing we adopted as a start was as follows:

20 cwt.	Reburnt oxide.
3 ,,	Sawdust.
2 ,,	Copperas.
1 ,,	Slaked lime.
55 galls.	Water.
Total 32 cwt.	

Generally speaking the properties of the ingredients are as follows:

(1) The reburnt oxide gives capacity for absorbing H_2S.

(2) The sawdust is for lightening the material and avoiding back pressure.

* Presidential Address to the London and Southern District Junior Gas Association.

(3) The copperas and lime form a precipitated iron oxide in a very reactive form to give speed of absorption.

One of the first points to be decided was whether to use burnt oxide fresh from the burners or from heaps which had been weathering for periods up to seven years. A sample of the newly burnt oxide and two samples of weathered were tested as follows: Each sample was heated at exactly 100°C. until the weight was constant. The loss in weight was recorded as moisture. A slow current of dried air was passed over the material heated in a tube to a red heat and the water evolved absorbed in weighed calcium chloride tubes. On a separate sample the amount of iron soluble in hot water was determined. The results were as follows:

	Newly burnt.	Weathered.	2nd Weathered
Moisture	17.7%	7.5% Dry basis.	19.4%
Combined water	1.16%	2.75%	2.55%
Equivalent to $Fe_2O_3H_2O$	11.5%	27.2%	25.2%
Soluble iron, Fe_2O_3	0.49%	0.05%	0.01%

This appeared to indicate that the newly burnt oxide contains some soluble iron which would be very desirable since it would be precipitated by the lime to very active oxide or hydroxide, whereas this product had apparently been washed out of both samples of the weathered oxide. On the other hand, the weathered samples appeared to have about double the amount of combined water, and probably therefore about double the proportion of active hydroxide. For the moment it was decided to concentrate on weathered oxide, and all early batches were made up from this type.

The next point to decide was whether to use sawdust from soft wood or hard wood, or peat as a lightening agent. In this case a bulk supply of cheap soft wood sawdust, almost all in the form of pine chips about $\frac{3}{16}$ in. long and about a quarter the cross-section of a match, was available. It appeared excellent as a lightening agent and was used. Later a large supply of hard wood sawdust was offered, but was too fine (almost like flour) and was found to cause back pressure. Peat appeared very desirable, but was expensive and difficult to obtain rapidly in large quantities so was temporarily "shelved." All batches therefore are lightened by soft wood sawdust.

The third ingredient, copperas, was obviously desirable to provide active iron. Roughly 5% was added in the early batches, and this proportion has been found sufficient to render the mixture sufficiently active for our purpose; so far additional quantities have not been found necessary.

The fourth point was the agent which should be used to neutralize the copperas. Lime was first tried successfully, but as our oxide is largely burnt in our own works and hence may return at very short intervals, its effect is bound to be cumulative. In burning, some calcium sulphate and hence potential plaster-of-paris is formed, which would be a very possible cause of caking. The obvious alternatives are soda and ammonia.

Six small-scale mixtures were made in the laboratory as follows:

No. 1. Burnt oxide as received.

No. 2. 10 g. of copperas dissolved in the minimum of hot water poured on to 17.5 g. sawdust and neutralized by 6 g. of soda ash (in solution) plus 100 g. of burnt oxide.

No. 3. As No. 2, but 880 ammonia used as neutralizing agent.

No. 4. As No. 2, but 5 g. slaked lime used as neutralizing agent.

No. 5. 10 g. of copperas ground together with 5 g. lime in a mortar, and added to the sawdust and burnt oxide.

No. 6. 10 g. copperas as crystals mixed into the lime-sawdust-burnt oxide mixture.

All were allowed to mature for a day or two, and were then put through our usual test, in which they are completely fouled with sulphuretted hydrogen in the absence of air, revivified, and the sulphur determined. The maximum temperature attained during fouling is recorded as a measure of activity.

The results were as follows:

Sample.	% sulphur.	Max. temp. rise, °F.	% S. calculated sawdust and lime free.
1	12.8	5	12.8
2	12.4	21	15.0
3	11.3	19	13.1
4	10.9	30	13.1
5	11.2	26	13.5
6	11.3	17	13.5

The results are interesting. The reburnt oxide alone shows 12.8% of sulphur, but only a 5°F. temperature rise. The first figure shows that it has quite a reasonable capacity for absorbing H_2S, but the low temperature rise indicates that the reaction takes place slowly. The next two mixtures, containing sawdust and copperas precipitated by soda and ammonia, show similar capacity (in spite of the inert sawdust) and a much greater temperature rise, indicating greatly increased activity. The fourth and fifth mixtures are similar, but a stronger alkali is used—slaked lime—and still greater activity is shown by a 30°F. temperature rise. Mixture No. 6 has the copperas mixed in as crystals instead of solution, and apparently the less effective distribution of it lessens the activity.

In the last column the sulphur present is calculated as a percentage on the burnt oxide plus copperas weight alone, thus eliminating the effect of the inert sawdust. It shows that the copperas has a favourable effect on the capacity of the oxide, as would be expected, but that this effect is not very marked, particularly when compared with its effect on the activity as shown by the temperature rise.

In view of these results, it was decided to try ammonia as the neutralizing agent for the copperas. The most efficient way to do this was to use the ammonia slip from the washers. A box holding 100 tons of oxide mixture would contain 14,000 lb. of copperas, and would require 60 million cu.ft. of gas with 20 grains of ammonia per 100 cu.ft.

A batch of oxide mixture was made without lime, but the effect was most marked. Compared with our normal boxes the result was poor and the box would not do its normal duty in the first position. It was tried in all four positions, and went round its usual cycle, but although it did some work, it was obviously supported by the other three boxes. It certainly improved gradually, and on emptying had reached 15.2% sulphur. After revivifying, it worked normally on its second cycle and reached 37.8% sulphur—a very great improvement. This test showed that the absence of precipitated iron oxide was very detrimental.

Various methods of curing this difficulty were examined, but the simplest method was developed from another line of experiments. By this time over 800 tons of the mixture had been put into action, much of it having reached its second and third cycles, and it was felt that it was time to use our normal procedure and mix a proportion of the mixture into part spent material.

A box containing one-third of burnt oxide mixture with lime and two-thirds of part spent oxide was tried, and was found very satisfactory, so a further box of half burnt oxide mixture without lime plus half part spent material was put to work. This was found equally satisfactory. It has not been proved whether the ammonia in the part spent material is sufficient to precipitate the copperas in the synthetic mixture, or whether the part spent material carries the bulk of the work until the ammonia slip has had time to precipitate the copperas. Of course there is only half the weight of copperas per box, and hence only half the ammonia would be needed. Further batches of 50% and 33% of burnt oxide mixture with and without lime plus the balance of part spent material were tried, and it was not found possible to detect any difference in results. Needless to say, no more lime was used, since when burnt in the sulphur burners lime is partially converted to calcium sulphate or plaster-of-paris, which is liable to form a caking agent.

Up to this point weathered burnt oxide had been used, but a delivery direct from the burners was now tried. It was used mixed with 50% part spent material, and no difference from normal could be found. This was a useful fact to learn, since it might not always be possible to obtain weathered oxide.

About a dozen further boxes followed on these lines—that is, burnt oxide mixture without lime mixed with an equal bulk of part spent oxide. All worked well, and the only trouble found was that some were caked hard when emptied. The proportion of mixture was decreased from 50% to 33%, which is our normal mixture, and the proportion of sawdust was slightly increased, and little further trouble from this cause has been experienced. Even with Dutch and Belgian bog ores occasional trouble from caking is found.

The procedure is now quite normal. Burnt oxide is received regularly and mixed with its sawdust and copperas into stock and used as new material. Mixtures of this with part spent material from previous synthetic mixtures are being used.

Naturally it is not so simple as buying a natural product and it involves more plant, labour, and supervision, but the success of our efforts has been gratifying and has helped us out of a difficult position.

No mention has been made of costs. It is felt that these would be misleading. The mixtures used are given, and anyone interested can get prices for the materials and work out their own costs under their own conditions of mixing. The problem was tackled from the war aspect alone, and had to be solved whether the process was more or less costly. Results are available of 20–30 100-ton batches, but owing to the shortage of paper are not included. Double or treble this number are now in normal work.

Discussion

Mr. **W. F. Browne** (Commercial Gas Company), who said how glad his undertaking had been to extend its help to other gas undertakings faced with the problem of purification by burnt oxide, expressed the view that the addition of copperas was fundamental to the process—in other words, the ferrous sulphate content of the mixture. He had experienced no trouble with the use of lime as a neutralizing agent. In fact, with lime neutralization burnt oxide had been used and re-used for a matter of 15 years without difficulty. Using ammonia he had found the outlet gas of the first box acidic even when the inlet gas contained 70 grains of ammonia, and acidic at the outlet of the second box with an inlet figure of 4 to 5 grains of ammonia. He had had trouble of stain when employing hardwood sawdust, but had overcome this by having no sawdust in the top tier.

Mr. **E. E. Calvert** (Gas Light and Coke Company) gave details of experiments carried out to determine the cause of traces of sulphuretted hydrogen at one works employing concrete purifiers (two layers of material 4 ft. 6 in. deep) and downward flow. Blame had been attached to the possibilities of leaky valves, leaky concrete, and bad oxide. Boxes had been emptied, valves renewed, air test with negative result applied to the concrete. None of these was the cause. Finally

they arrived at the conclusion that the time spent in box emptying was insufficient to ensure that the old oxide was completely removed from the sides of the boxes. Old oxide was growing on the sides of the boxes and on the inlet and outlet pipes, and eventually this oxide contained a large sulphur content. After thorough cleaning of all the boxes no further trouble had been experienced. He asked whether the purifying area had to be increased when using spent oxide.

Mr. **Dougill** replied that they were running on the same areas. Also, using ammonia as neutralizing agent, he had had no trouble with acidic boxes.

Mr. **C. A. Deas** (Tottenham) asked whether, with split flow, more gas went through one layer than another, and how the inlet temperature of the gas was maintained at 85°F. With one batch of burnt oxide he had experienced a great deal of back pressure—as much as 30 in. W.G.

Mr. **Dougill** said that with split flow he had not found much variation in the sulphur content of the two layers of oxide. The flow, he thought, was self balancing, though they must remember that mass production methods of working were used at Beckton; the streams were symmetrical and the process worked. A temperature of *circa* 85°F. was maintained in winter by the use of indirect steam. No direct steam was employed, but there was no over-cooling in the condensers in winter, and this was equivalent to the admission of direct steam. With a 50 : 50 mixture of burnt and spent oxide there had been no back-pressure difficulties.

Dr. **G. W. Anderson** thought that Mr. Dougill had been lucky in that he had been supplied with burnt oxide from mechanical burners as distinct from hand burners. The hardening of oxide in the boxes was a question of control of moisture content. Personally he had never been satisfied that burnt oxide really had any capacity for sulphuretted hydrogen, though obviously the sulphates in the mixture, decomposed by alkali, produced activity. He also thought that ammonia was a far better neutralizing agent to use than lime, and he suggested that they would be well advised to steer clear of hardwood sawdust as a lightening agent. Evolution of H_2S from the sawdust was due to bacterial action which took place in the dark. Had this phenomenon been investigated?

Mr. **Dougill** said his remarks must be taken as a background of the use of burnt oxide. His wartime Paper was on practice and he had eschewed theory. In regard to the type of burnt oxide, he considered its efficacy was not so much a question of the method of burning—mechanical or hand—as the temperature at which the material was burnt off. Burnt oxide, he considered, was the mainstay of the process, the copperas acting in the role of primary activator.

Mr. **Braidwood** (Southend) gave an account of the satisfactory use of peat moss (42% by volume) in the mixture. They had found layering quite satisfactory as a method of mixing. The mixture had a longer life when the boxes had top inlets than when the boxes had bottom gas inlets.

Mr. **Dougill** remarked that downward flow gave more purifying area to the incoming gas than did upward flow; with the latter the area occupied by the grids effected a reduction.

Mr. **F. O. Hawes** suggested that the purifying action with active material was predominantly a surface effect, and that the "modern oxides" would probably demand a larger area than that which served for the oxides employed pre-war.

Yorkshire Juniors

A Meeting of the Yorkshire Junior Gas Association was held on Saturday, April 18, at the Bridge Street Works of Leeds Corporation Gas Department, presided over by Mr. T. G. Lewis, President of the Association.

Mr. V. J. J. Siddons, Engineer and Manager, Rawmarsh, opened a discussion on "Speculative Outlook on Post-War Planning." The discussion which followed Mr. Siddons' remarks clearly indicated the very keen interest shown by members on this all-important subject.

At the close of the meeting, Mr. Siddons was thanked for leading the discussion. A vote of thanks was also extended to Mr. C. S. Shapley and the Gas Committee of the Leeds Corporation for the facilities granted to the Association.

Mobile Producer Gas Association

Manufacturers of mobile producer gas equipment have formed themselves into the Mobile Producer Gas Association, with headquarters at 120, Pall Mall, London, S.W. 1. The objects are to tabulate joint experience, rationalize man power and manufacturing resources, and to place at the disposal of transport undertakings and responsible authorities all the information and assistance necessary to bring about the widest possible use of producer gas. The feeling of the members is that all vehicles on the home front which can operate successfully on home-produced fuel should be converted without delay. Mr. J. W. Noel Jordan is Chairman of the Association, Mr. E. R. Slattery is Vice-Chairman, and Mr. R. M. Young is the Hon. Secretary.

Extra Clothes Coupons

Eighty-three classes of workers in gas-works and on coke and by-product plants whose occupation gives rise to heavy clothing needs are entitled to supplementary clothing coupons under the second industrial clothing award recently issued by the Board of Trade. They are divided into three categories according to the extent of their clothing needs. Thirty classes in the first group, covering such jobs as oven charging, retort firing, and coke quenching, get 45 additional coupons per person; 29 in the second group, covering coal washery workers, tar, scrubber, purifier, water gas, and producer gas plant attendants, get 25 each; and 24 in the third group, which includes toluole, benzole, and phenol plant attendants receive 15 each. There are seven classes of workers in a fourth category in respect of which the Board has decided not to make any award. Claims for supplementary coupons are put forward by the trade unions to the T.U.C., who submit them to the Board of Trade. Where the workers are not in the appropriate trade union the employer may transmit the application through his employers' federation to the Board; where neither the workers nor the employers are members of recognized organizations, applications may be submitted by the employer direct to the Board, at Neville House, Page Street, London, S.W. 1.

Coupons for Overalls

A Board of Trade explanation of the reason why the surrender of clothing coupons for engineers' overalls is necessary is given in the April issue of the *Broomwade News Bulletin*. The materials have to be shipped, spun, and woven by labour which could be used for making munitions. Overalls save clothes and leave the wearer better off than workers without such protection, and to demand coupons therefore makes it fair for all. Workers must surrender coupons for all overalls loaned or supplied by an employer, the collection of coupons being arranged between them. Firms taking on a lot of new workers who have not enough coupons to "pay" for their initial outfit may apply for a "loan" of coupons from the Board of Trade, Granville Court, Bournemouth. Industries may claim through the T.U.C. for extra coupons in cases where work of a special nature wears out overalls unusually quickly.

A Meeting of the Central Executive Board of the National Gas Council will be held at Grosvenor House, Park Lane (Park Suite), on May 12, at 2.30 p.m.

At a Meeting of the London and Southern District Junior Gas Association on April 24 Mr. G. Dougill, of the Gas Light and Coke Company, was inducted as President by the retiring President, Mr. F. O. Hawes, of Tottenham, who has held the office for 2½ years. It was announced at the meeting—the occasion of Mr. Dougill's Address on Purification by Burnt Oxide (see p. 166)—that Mr. T. S. Ricketts had been awarded the Medal of the Society of British Gas Industries for his Paper on "The Steam Load on Small Gas-Works." (An abstract of the Paper was given in the "JOURNAL" of March 19, 1941.) Mr. Ricketts has already been awarded the Milbourne Medal for this Paper ("JOURNAL," April 1).

Dividends totalling 4% for the year ending Dec. 31, 1941, have been paid by the Auckland Gas Co., Ltd., N.Z.

The General Committee of the National Federation of Gas Coke Associations will meet on Tuesday, May 12, at Gas Industry House at 11 a.m.

The South-Western Gas and Water Corporation, Ltd., recommend a final dividend of 3% (actual), less income-tax, for the year ended Dec. 31, 1941, making a total dividend of 5% for that year.

The Annual General Meeting (5 p.m.) and Sessional Meeting (5.30 p.m.) of the Illuminating Engineering Society will be held at the Institution of Mechanical Engineers on Tuesday, May 12, when an Address on Street Lighting—Past, Present, and Future, will be given by Mr. G. H. Wilson.

At the Ordinary General Meeting of the Montevideo Gas & Dry Dock Company, Ltd., to be held on May 19, the Directors will recommend payment of a final dividend of 3% free of income-tax, 2% of which will be payable on May 20, and 1% on Dec. 1, making with the interim dividend of 1% paid Dec. 1, 1941, 4% free of income-tax for the year ended Dec. 31, 1941.

The Directors of the Gas Light and Coke Company announce that after considering the accounts of the Company for the year 1941, they are unable to recommend to the proprietors the payment of dividends for that year on the 3¼% Redeemable Preference Stock (1970), the 4% Consolidated Preference Stock, the Ordinary Stock, and the 3½% Maximum Stock.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

GAS DISTRIBUTION*

By W. HODKINSON, *General Manager*, and H. B. TAYLOR, *Chief Engineer*,
West Yorkshire Gas Distribution Company.

THE Gas Industry is giving serious attention to its probable position in the post-war era, and it is now generally accepted that schemes of co-ordination, probably on a regional basis,are highly desirable.

For a number of years some leaders in the Industry, and more recently Papers in the Technical Press, have pointed to the weakness of the position arising out of the large number of relatively small units which to-day form this highly important fuel industry. It is our opinion that the needs of the Industry can best be satisfied by re-organization into large manufacturing units, and the adoption of high-pressure distribution over much wider areas than has hitherto been considered possible. In this Paper we endeavour to substantiate this view, which is based upon experience gained in the operation of the West Yorkshire Gas Distribution Company.

The advance in both local and regional planning represented by the Distribution Company was only made possible through the development of a Holding Company, the United Kingdom Gas Corporation, Ltd., under the direction of Colonel W. M. Carr, who has frequently voiced his opinion that distribution companies might well be owned jointly by publicly and privately owned gas undertakings.

Post-War Developments in the Gas Industry

The Technical Planning Committees of The Institution of Gas Engineers are considering, *inter alia*: (*a*) Standardization of calorific value—an obvious forerunner of a highly desirable attempt to standardize specification. (*b*) The organic sulphur problem—a reduction of the total sulphur content to the region of 6–8 grains per 100 cu.ft. is generally recognized as essential.

Account must also be taken of research work, much of which had reached an advanced stage prior to the war. This may be summarized: (1) Complete gasification, using oxygen; (2) water gas production using oxygen; (3) methane synthesis; (4) C-H-O- synthesis (Fischer Tropsch); (5) hydrogenation.

The trend of research is towards the development of the carbonizing industry into a highly skilled chemical industry, which will inevitably result in the concentration of manufacture in large-scale units from which gas will be distributed in bulk.

The West Yorkshire Gas Distribution Company

This Company was planned and conceived by Colonel W. M. Carr, as Managing Director of the United Kingdom Gas Corporation, of which Corporation it is a subsidiary. It is the first statutory Gas Distribution Company to be incorporated as such, deriving its powers from the West Yorkshire Gas Distribution Act, 1938.

Three points of importance may be noted in this Act: (1) The principal object is the co-ordination of gas supplies. (2) Gas may be bought from both coke ovens and gas-works. (3) Gas may only be sold to other gas undertakings.

The Bill as promoted provided for the power to supply gas to, or to purchase gas from, all gas undertakings in the proposed area, but owing to opposition the area of supply was restricted by Parliament to the existing limits of undertakings controlled at that time by the United Kingdom Gas Corporation, Ltd. It may be said that most other undertakings then opposed the project. There are signs that, with a greater knowledge of the scope and limitations of the Company, this latent opposition is decreasing.

If the war had not intervened it is most probable that the system would by now have been increased by a further 45 miles, thus completing its development so far as undertakings at present controlled by the United Kingdom Gas Corporation require it. Whether this is finality or a beginning largely depends upon the future reaction of the Gas Industry to this example of private enterprise. We are confident that very great advantages would accrue to the undertakings in the West Riding if after the war they co-operate with us in the extension of this system. Our existing mains are of sufficient size to serve as a nucleus of a future Regional Grid, the shape of which stands out on any map.

Grid System.—The Company's system is now extensive and embraces both industrial and rural areas. The density of the system—*i.e.*, the average length of main between each station—is at present 5.5 miles. 4½ miles of main is being laid to yet another undertaking. In addition there is a large mileage of high-pressure mains fed with gas at pressure from the Company's system, but operated by the various undertakings. The mains range from 4 in. to 18 in. bore; an initial pressure of 35 lb./sq. in. is provided for; the mains are at present only working at about 20% of full load; only purified gas is distributed.

Coke Ovens.—From some coke ovens gas is bought purified and compressed, both processes being under the control of the coke oven management, the Company having the right of inspection and analysis. From other coke ovens unpurified gas is taken to nearby works controlled by the Corporation, where it is purified and compressed.

Purified Gas.—It is cheaper to operate large purifiers than small, thus for economic working the purifiers should be situated at the points where the greatest quantities of gas are present. In the case of the Sheffield grid, where many coke ovens transmit gas towards a central point, purifiers are situated at this point and crude gas is piped. In the case of our own grid the converse holds; a few coke ovens supply gas to many receiving points. Hence the purifiers are situated at the coke ovens and clean gas is piped.

A supply of purified gas permits of the complete closure of small gas-works for all purposes except storage. It also makes possible the supply to a local high-pressure main of gas at pressure, thus avoiding the cost of recompression.

A crude gas grid has the advantage that certain large industrial loads can be met with crude gas at a reduced price. Conversely only a clean gas grid can supply the many rural loads which would be made available to an extensive system. The perhaps obvious disadvantages of blocked mains, resulting in high maintenance charges and compression costs, can only be avoided by transmitting clean gas.

Except, therefore, for a specialized industrial grid, we consider clean gas only should be piped.

Gas Specification.—All gas supplied is to a common specification, which is maintained within narrow limits. Full co-operation of our suppliers is readily given for testing and analysis work at the coke ovens.

The gas must be free from sulphuretted hydrogen, as proved by the Gas Referees' test; free from tar as ascertained by the usual test; contain not more than ½ grain of ammonia, 12 grains of cyanogen, and 1 grain of naphthalene in summer and ½ grain in winter per 100 cu.ft.; contain not more than 4% of carbon dioxide, 0.5% of oxygen and 17% of total inert gases; be of a density not exceeding 0.48 (air = 1); be of a maximum calorific value of 515 and a minimum of 500 B.Th.U. gross, and average not less than 505 B.Th.U. gross over any 24-hour period; be delivered into the Company's mains at any pressure up to the maximum specified at a temperature of not more than 5° F. over that of the cooling water used.

It will be noted that a standard calorific value of 500 B.Th.U. per cu.ft. has been adopted for the scheme, and it follows that we have achieved over a large area the standardization which is so highly desirable.

Control of the method of dilution is maintained by the restriction of the proportion of inerts in the specification.

Dry Gas.—Efficient drying of the gas is attained through compression with after cooling, and the following test figures of dew point are of interest:

TABLE I.

Location.	Gas temperature. °F.	Dew point. °F.
Coke oven "A"	47	20
" " "B"	46	16
" " "C"	49	17
Station 1	45	12
" 2	50	11.5
" 3	44	8
" 4	47	8
" 5	50	8

Station No. 3, where settled conditions are attained, is situated at a point 12.9 miles from the nearest point of intake from a coke oven.

Organic Sulphur.—At one of the coke ovens supplying gas into the grid, extraction of sulphur compounds is achieved by the use of oil washing under pressure. The process consists, in brief, of washing with oil for benzole and sulphur that portion of the gas delivered into the grid at the delivery pressure (30 lb. per sq. in.).

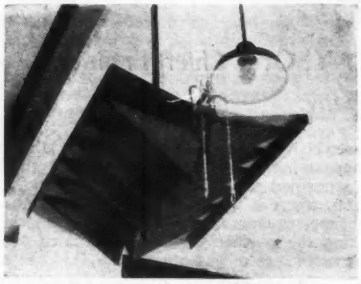
The theoretical quantity of gas oil required for the extraction of 3 gallons of benzole per 10,000 cu.ft. of gas amounts to 7 gallons per 1,000 cu.ft., or at a scrubber efficiency of 80%, 8.75 gallons per 1,000 cu.ft. of gas washed.

To achieve a reduction of the organic sulphur compounds from 30 to 6 grains per 100 cu.ft. the quantity of wash oil circulated must be increased to about 32 gallons per 1,000 cu.ft. of gas washed.

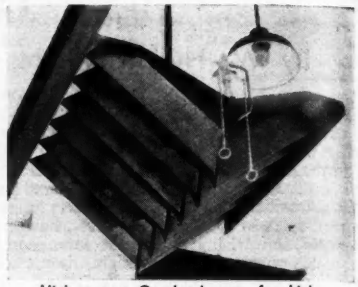
An increase in the pressure of the gas at the washer from 15 lb. per sq.in. (absolute) to 45 lb. per sq. in. (absolute) raises the partia l pressure of the benzole and likewise that of the sulphur compounds three times. The required quantity of wash oil to effect the desired extraction is thus reduced to approximately one-third, and 11 to 12 gallons per 1,000 cu.ft. will suffice.

* Précis of a Paper to the Coke Oven Managers' Association, April 29.

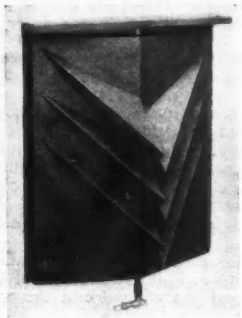
RADIANT HEATERS FOR FACTORIES



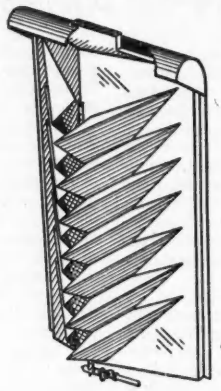
Medium power Overhead type for low fixings, consumption up to 40 cubic feet per hour.



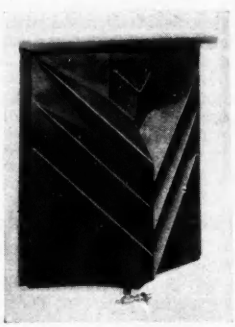
High power Overhead type for high fixing, consumption up to 60 cubic feet per hour.



Small Vertical type with external flue, consumption up to 40 cubic feet per hour.



Large Wall type capacity up to 80,000 B.Th.U.



Small Vertical type with balanced external flue, consumption up to 40 cubic feet per hour.

Low initial cost. Simple fixing. No more Cold Spots. Quick deliveries.

THOMAS POTTERTON (Heating Engineers) LTD.

CAVENDISH WORKS, 20-30, BUCKHOLD ROAD, WANDSWORTH, LONDON, S.W.18

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A firm having 40 years' experience in Gas Boiler design and manufacture

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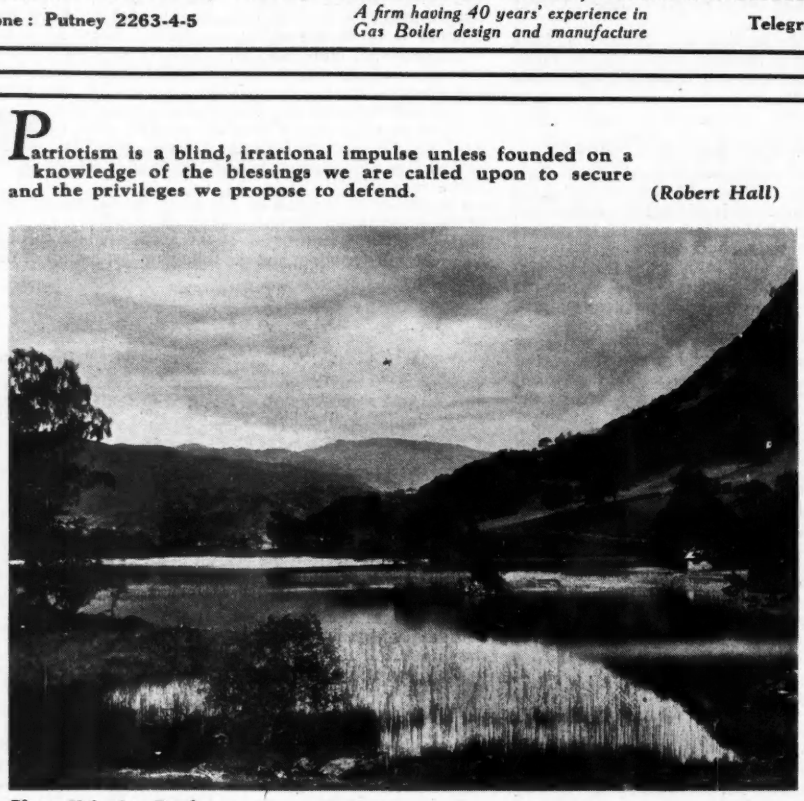
Patriotism is a blind, irrational impulse unless founded on a knowledge of the blessings we are called upon to secure and the privileges we propose to defend. (*Robert Hall*)



Rydal Water, Westmorland

Photo: Valentine, Dundee

ALDER & MACKAY LTD of Edinburgh

The following are recent tests on this plant:

Outlet washer.		Sulphur compounds.
Test No. 1	.	4.18 grains per 100 cu.ft.
" " 2	.	4.40 " " "
" " 3	.	4.06 " " "
" " 4	.	4.42 " " "

These figures are, so far as we are aware, comparable with the most advanced practice in the country at the present time, and we are satisfied that this step will add to the efficiency of the gas service which we have to offer in the Grid Company's area.

Loads.—Before designing the grid it was necessary to estimate the future loads to be provided for at each station. "Domestic and Commercial" expansion could be reasonably accurately forecast, and was seldom less than 100%. "Industrial" expansion was arrived at by means of an industrial survey of each district by experienced engineers capable of assessing the total heat requirements of the various industries which could economically be met by grid gas. As an example a survey of twelve undertakings which made in 1936 850 million cu.ft. showed a potential industrial demand of 3,650 million cu.ft.; mains sizes were therefore calculated to handle a total of 5,350 million cu.ft., representing a potential expansion of more than 600%—a measure of confidence in the future of grid gas.

To show that these potential loads are not entirely fantastic we give below details of one typical undertaking supplied from the grid.

TABLE II.

Year.	Gas sales thous. cu.ft. Domestic and commercial.	Public lighting.	Industrial.	Total.	No. of consumers (domestic).	Consumption per domestic consumer.
1938	94,949	3,579	88,835	187,363	9,728	9,760
1939	100,185	1,985	107,522	209,692	9,673	10,357
1940	104,760	—	124,065	228,824	9,707	10,792
1941	113,487	—	185,938	299,938	9,781	11,601

It will be seen that in three years the total sales have increased by 60% and that, far more important, the consumption per domestic consumer is steadily increasing.

In a number of other undertakings we have had increases of over 100% per year. We have thus every reason to believe that the potential load will eventually mature.

Design.—Any grid system will be designed to handle the future loads expected, and it will have been seen above that any estimate of these loads can only be approximate to an extreme degree. There therefore seems to be little point in using an elaborate formula, even though this may be known to be of greater accuracy, provided that a simple formula yields conservative results.

For this reason it has been our custom to use the tabulated form of Dr. Pole's high-pressure formula derived by Woodall and Parkinson. By this means it is possible to perform very quickly all calculations required by the most complex grid system.

Type of Main.—Generally spun iron pipes equal to B.S.S. Class B with mechanical joints have been used. It may be said that we could find no technical reason sufficiently strong to sway the decision towards either steel pipes with welded joints or spun iron pipes with mechanical joints. Each had points for and against their adoption. A careful study of the cost of the main laid showed each about equal. The decision to use spun iron pipes was made on account of the much greater speed in mainlaying to be secured by their use.

One early section of 5 miles of 8-in. main was laid in steel with welded spherical joints, and has given every satisfaction. Our only criticism is the slower speed of mainlaying, particularly in built-up areas where the many obstructions make the use of long lengths most difficult.

Valves.—Valves are provided at all branches and at intervals of one mile in all mains. The valves are accommodated in pits of such size as to enable two men to work in them.

Steel Main.—Where the main is carried above ground—*e.g.* over rivers or railways—steel main is used. Every care was taken in the design of these crossings to avoid points of future corrosion.

At all points where the minimum cover of 3 ft. could not be obtained, steel mains embedded in reinforced concrete were used, the mains being unprotected in any way before concreting.

Flanged Jointing.—We have standardized flanges to B.S.T. "E" bracketed between bolt holes, and using half-faced joint rings made up of a soft asbestos material $\frac{1}{16}$ in. thick.

Load Factor.—It is of the greatest importance that any high pressure system be operated at as near constant load as is possible. In assessing the average hourly load one twenty-fourth of the day's load is taken; the maximum hour's send-out from any station is likely to approach twice the average hour; thus, if all stations were supplied direct from the grid this, with the compressors, would have to have double the capacity otherwise required, and considerable storage, or a very flexible plant, would be needed at each manufacturing works.

A steady rate of take can be attained by having adequate effective holder capacity at each station and by seeing that the holders are worked. To have the holders always full as a margin of safety, as is so often done when bulk supplies are taken, would prove fatal to any grid scheme.

For similar reasons no direct supplies can be given from grid mains into outlying points on any station's low-pressure distribution system where pressure troubles may occur.

It is fortunate that any grid system supplying gas to stations recently manufacturing gas is able to take advantage of the storage capacity already there. This must be maintained and increased as the loads develop, both for the purpose of evening the demand upon the grid and for providing a standby to cover the time when the bulk supply is cut off during necessary repairs to the trunk mains.

Rural Loads.—One of the advantages of any grid system is that the trunk mains will pass through villages otherwise without gas, and it is desirable that supplies be made available. It is unlikely that the sales so secured will permit of the installation of a holder, but as the total peak hour demand at these stations will only be small, little effect upon the operation of the grid will be felt.

It is suggested that nothing less than a group of 50 domestic consumers, supplied through a common governor and meter, should be connected to a grid.

In cases where there is no holder, a standby supply can usually be provided by means of a small booster installed at the nearest holder station and supplying back into the grid.

"Unaccounted for" Gas.—Our experience to date has been almost entirely with spun pipes having mechanical joints. The mains are tested with air at 60 lb./sq.in. pressure, both before the trench is back filled and upon completion. After the initial fall in pressure, due to condensation of the oil and water vapour entrained in the air, no further fall is permitted over a period of 12 hours. It may therefore be said that the mains are tight when accepted. The average "unaccounted for" to date is 2·75%.

(*To be continued*)

According to the Directors' Report of the Maryborough Gas and Coke Co., Queensland, gas sales during 1941 showed an increase of 10.9% as compared with 1940. Dividends of 10% for the year have been paid. Five increases in the price of coal have caused production costs to show a considerable increase during the year.

In his Review for the year ending Dec. 31, 1941, the Chairman of the Wellington Gas Co., Ltd., N.Z., reported that the increase in the sales of gas during the past five years was equal to the whole year's sales in 1905. Dividends totalling 7% for the year were recommended compared with 8% previously paid. The Chairman drew attention to the fact that there would be a substantial reduction in taxation, the present rate of which was 12s. 1d. in the £, if the law were amended so that taxes on dividends were paid by individual shareholders instead of by the Company, and suggested that though there could be no objection to necessary taxation, especially in wartime, it was a matter of serious concern to all gas companies that they should be subject to heavy taxes from which electrical undertakings, operating in the same district, were exempt.

Despite the Increased Cost of coal and most other raw material used by the City of Perth (W.A.) Gas Department, Mr. F. C. Edmondson, General Manager, stated in his Annual Report for the year ended Sept. 30, 1941, that the past year was the most successful in the history of the Department. A reduction in price is announced, the first step of 210 units at 0.8d. per unit being eliminated altogether, and the price reduced so that the first rate on the table is 210 units at 0.7d. per unit.

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Gas Products Prices

The London Market April 27.

Two Orders have been published, viz.:

(1) The Road Tar Prices (Inland) Order—Statutory Rules and Orders, 1942, No. 659—Controlling the prices of Road Tar.

(2) The Coal Tar Acids Prices (Inland) Order—Statutory Rules and Orders, 1942, No. 731—Controlling the prices of Coal Tar Acids.

Both Orders, details of which are given on p. 165, come into force on the 1st of May, 1942.

Otherwise, there are no changes to report in the Prices of Coal Tar Products in the London Market.

The Provinces April 27.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 1s. 10d. (controlled by the Control of Toluene No. 2 Order, July 5, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 11d. to 1s. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 9d. to 1s. 10d. Creosote, *ex* works, in bulk, North, liquid and salty, 4½d. to 4¾d.; Scotland, 4¼d. to 4¾d.; low gravity, 4¼d. to 4¾d. Fuel Grade, 4d. to 4¼d. Carbolic acid, 60's, 3s. 7½d. to 3s. 9d. Naphthalene, £15 to £20. Salts, drained, £6 to £6 10s.; whizzed 72°, £7 15s.; 78°, £9 5s. Anthracene prices fixed by Controller. Heavy oil: Unfiltered anthracene oil (min. gr. 1,080), 6d. to 6½d.; filtered heavy oil (min. gr. 1,080), 6½d. to 7d.; heavy anthracene oil gr. less than 1,080, 5¾d. to 6d.

*In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland April 25.

Demand strong, with prices firm. Refined tar: Controlled prices became operative on May 1 (S.R. & O. No. 659, price 2d.). The yield to makers will be round 4¾d. to 5¼d. per gallon, *ex* Works, naked. Creosote oil: Specification oil, 6¼d. to 6½d.; low gravity, 7d. to 7½d.; neutral oil, 6½d. to 6¾d. per gallon; all *ex* Works in bulk. Cresylic acid is not readily procurable. Pale 99/100%, 5s. to 5s. 6d.; Pale 97/99%, 4s. 6d. to 5s.; Dark 97/99% 4s. 3d. to 4s. 6d. per gallon; all *ex* Works in buyers' packages. Crude naphtha: 6½d. to 7d. Solvent naphtha: 90/160 grade 2s. to 2s. 3d. and 90/190 Heavy Naphtha 1s. 9d. to 2s. per gallon. Pyridines: 90/160 grade 13s. and 90/140 grade 15s. per gallon.

Gas Stocks and Shares

The volume of business in the Gas Market was a trifle less last week. In view, however, of the large number of stocks marked up, and in some cases it will be noted the rise is considerable, inquiries are doubtless on the increase, especially for the fixed-interest stocks. So closely are these stocks held that among those shown in the lists below as having appreciated during the week are several which have not changed hands for many months past. One of these is the East Surrey 5% debenture, which gained no less than 10 points, the last recorded transaction being in October last at 91.

The following price changes occurred during the week:

OFFICIAL LIST

Barnet Ord.	125—130	+3
Bombay	18/—20/-	−1/-
Cardiff Ord.	97—102	+2
Commercial 5 p.c. Deb.	93—98	+1
East Surrey 5 p.c. Deb.	100—105	+10
Gas Light Units	12/3—13/3	−-/3d.
Ditto 4 p.c. Pref.	62—67	−4

OFFICIAL LIST—*continued.*

Ditto 4½ p.c. Deb.	103—107	+1
South-Eastern Gas Corporation 4 p.c. Pref.	12/6—14/6	+-/6d.
South Suburban Ord.	75—80	+2
Ditto 5 p.c. Pref.	91—96	+6
Ditto 4 p.c. Pref.	74—79	+1
Ditto 5 p.c. Deb.	105—110	+3
Southampton Ord.	70—75	+7
Tottenham 5 p.c. Pref.	90—95	+5
Wandsworth 5 p.c. Deb.	105—110	+6
Ditto 4 p.c. Deb.	84—89	+2

SUPPLEMENTARY LIST

Cheltenham 4 p.c. Deb.	80—85	+5
North Middlesex 5 p.c. Pref.	80—85	+5

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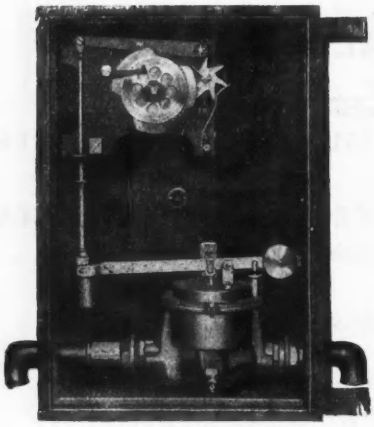
Fig. 49.



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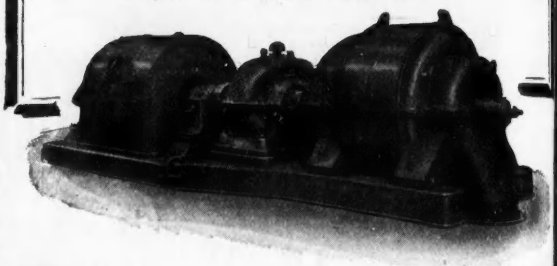

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CONTENTS

EDITORIAL NOTES

Fuel Rationing 203
Producer Gas for Motor Transport .. 204
Coke Rationing 204
Gas Shortage in Dublin 204

Personal 205
Obituary 205
1942 "JOURNAL" Directory 205
Letter to the Editor 205
Melchett Medallist for 1942 205
Proposed Scheme of Fuel Rationing .. 206
Association of Tar Distillers 209
Gas Distribution. By W. Hodkinson and H. B. Taylor (*continued*) .. 210
Gas Products Prices 217
Gas Stocks and Shares 219
Stock and Share List 219

THIS WEEK'S ADVERTISERS

	PAGE
Abbott, Birks & Co., Ltd.	187
Aerospray Manufacturing Co., Ltd.	193
Alder & Mackay, Ltd.	216
Bale & Church, Ltd.	221
Belliss & Morcom, Ltd.	186
Blakeley, Firth, Sons & Co., Ltd.	221
Bratt Colbran, Ltd.	197
British Gas Purifying Materials Co., Ltd.	221
British Thomson-Houston Co., Ltd.	Cover IV
Broadbent, J. C., & Co., Ltd.	221
Cowan, W. & B.	Cover III
Crone & Taylor, Ltd.	188
Crossley-Premier Engines, Ltd.	193
Curtis, A. L., & Co., Ltd.	220
Dempster, Robert, & Sons, Ltd.	221
Derbyshire Silica Firebrick Co., Ltd.	196
Diaphragm & General Leather Co., Ltd.	Cover II
Dick, R. & J., Ltd.	188
Donkin Co., Ltd. (The Bryan)	Cover II
Ellison Insulations, Ltd.	221
Ether, Ltd.	186
Evans, Joseph, & Sons (Wolverhampton), Ltd.	190
Fluxite, Ltd.	222
"Four Oaks" Spraying Machine Co.	190
Gas Meter Co., Ltd.	192
Gas Purification and Chemical Co., Ltd.	221
Glover, George, & Co., Ltd.	185
Glover, Thos., & Co., Ltd.	202
Goodall, Clayton & Co., Ltd.	Cover IV
Grant, David & Co.	194
Green & Boulding, Ltd.	221
Hamilton, Archd. H., & Co., Ltd.	220
Harrisons (London), Ltd.	221
Hilmor, Ltd.	193
Holmes, W. C., & Co., Ltd.	Cover I, 223
Horseley Bridge and Thos. Piggott, Ltd.	199
Humphreys & Glasgow, Ltd.	200
Institute of Chemistry	221
Jeavons, E. E., & Co., Ltd.	222
Keay, E. C., & J., Ltd.	224
Keith Blackman, Ltd.	224
Kings Patent Agency, Ltd.	221
Lancashire Dynamo Crypto, Ltd.	191
Londex, Ltd.	220
London Electric Firm, The	220
Main, R. & A., Ltd.	214
Menno Compressed Air Greasecup Co., Ltd.	221
Mewburn, Ellis & Co.	221
Milne's Meters, Ltd.	198
Mitchell, H., & Co.	220
Morton, Joseph, Ltd.	Cover IV
Newton Chambers & Co., Ltd.	208
Oxley Engineering Co., Ltd.	189
Parkinson, W., & Co.	202
Peckett & Sons, Ltd.	220
Pulsometer Engineering Co., Ltd.	Cover IV
Radiant Heating, Ltd.	199
Radiation, Ltd.	212, 213
Rawlplug Co., Ltd.	216
Reavell & Co., Ltd.	196
Sawer & Purves, Ltd.	211
Siebe, Gorman & Co., Ltd.	220
Slingsby, Walter, & Co., Ltd.	194
Sperryn & Co.	201
Stanton Ironworks, Ltd.	222
Staveley Coal and Iron Co., Ltd.	195
Stein, John G., & Co., Ltd.	195
Strachan & Henshaw, Ltd.	185
Sutcliffe, Speakman & Co., Ltd.	196
Thomas & Bishop, Ltd.	217
Trotter, Haines & Corbett, Ltd.	221
Turbine Furnace Co., Ltd.	198
Underpressure Engineering Co., Ltd.	192
Walker, C. & W., Ltd.	211
West's Gas Improvement Co., Ltd.	218
Wilkes, A. H., & Co.	198
Woodall-Duckham Co., Ltd.	207
Trade Cards	217
Appointments Vacant	222
Contracts Open	222
Educational	221
Patents	221
Plant, &c.	221
Plant, &c., For Sale and Wanted	222

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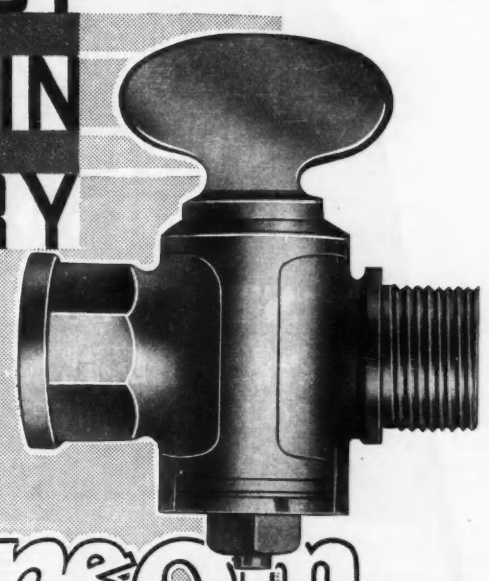

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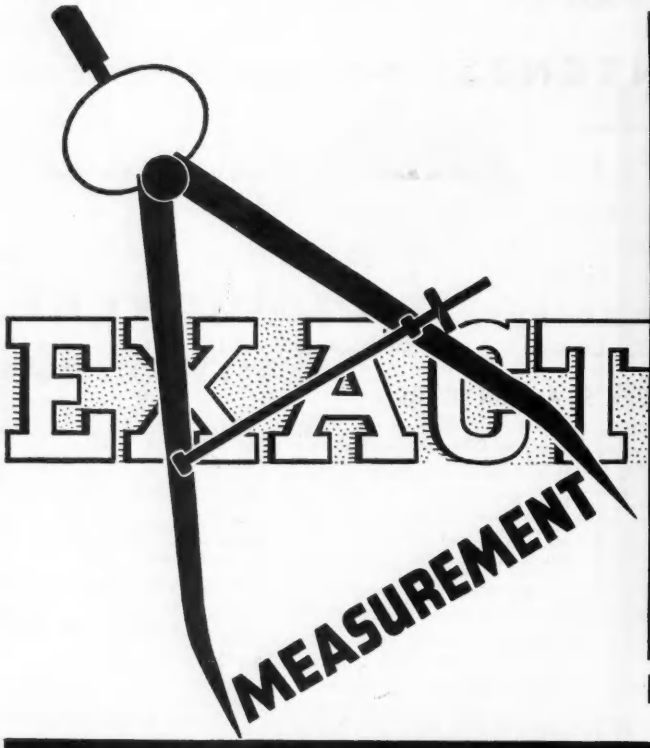

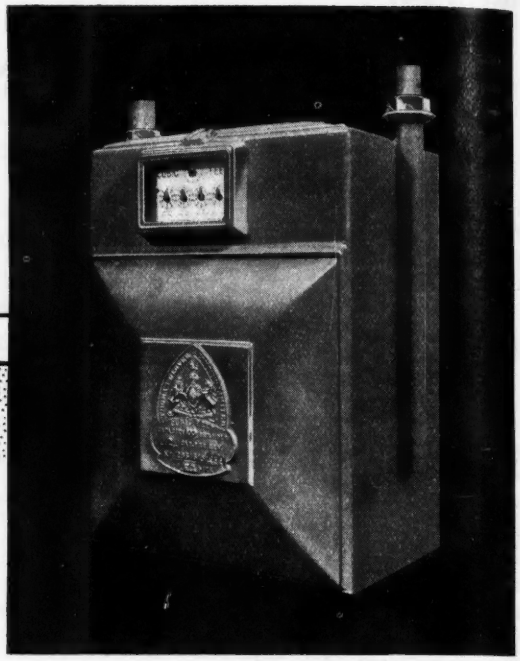

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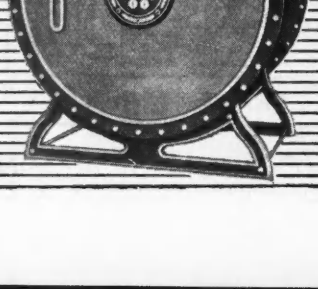

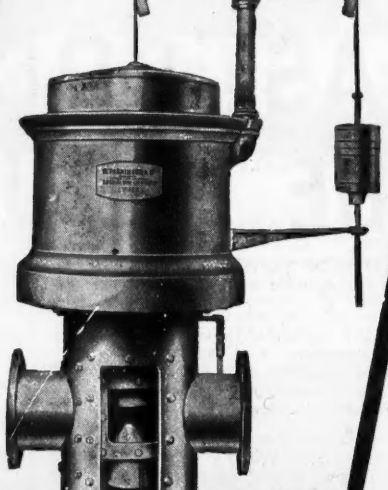

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